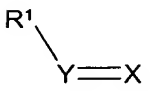
Patent Claims

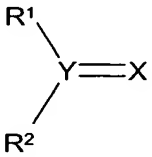
1. Organic electroluminescent device comprising anode, cathode and at least one emission layer comprising at least one matrix material A which is doped with at least one phosphorescent emitter, and at least one hole-blocking layer comprising at least one hole-blocking material B, characterised in that the hole-blocking material B contains at least one chemical structural unit of the formula Y=X, where X has at least one non-bonding electron pair and where the radical X stands for NR, O, S, Se or Te, and R stands for an organic radical having 1 to 22 carbon atoms or for OH, OR, NH_2, NHR^6 or $N(R^6)_2$, where R^6 = H or an organic radical having 1 to 20 C atoms, and where the radical Y stands for C, P, As, Sb, Bi, S, Se or Te, with the proviso that the matrix material A is not identical with the hole-blocking material B.

2. Organic electroluminescent device according to Claim 1, characterised in that it comprises a hole-blocking material B conforming to the formulae (1) to (4) according to scheme 1

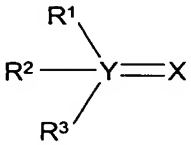
Scheme 1



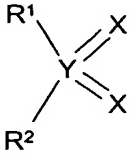
Formula (1)



Formula (2)



Formula (3)



Formula (4)

where the symbols used have the following meaning:

Y is, identically or differently on each occurrence, C in the formula (2) and P, As, Sb or Bi in the formulae (1) and (3) and S, Se or Te in the formulae (2) and (4);

X is on each occurrence, identically or differently, NR^4, O, S, Se or Te;

R^1, R^2, R^3 is, identically or differently on each occurrence, H, F, CN, $N(R^4)_2$, a straight-chain, branched or cyclic alkyl, alkoxy or thioalkoxy group having 1 to 40 C atoms, which may be substituted by R^5 or also unsubstituted, in which one or more non-adjacent CH_2 groups may be replaced by $-R^6C=CR^6-$, $-C\equiv C-$, $Si(R^6)_2$, $Ge(R^6)_2$, $Sn(R^6)_2$, C=O, C=S, C=Se, $C=NR^6$, -O-, -S-, $-NR^6-$ or $-CONR^6-$ and in which one or more H atoms may be replaced by F, Cl, Br, I, CN or NO_2, or an aromatic or heteroaromatic ring system or an aryloxy or heteroaryloxy group having 1 to 40 aromatic C atoms, which may be sub-

stituted by one or more radicals R^5; a plurality of substituents R^1, R^2 and/or R^3 here may form a mono- or polycyclic, aliphatic or aromatic ring system with one another; or an aromatic or heteroaromatic ring system bonded via a divalent group -Z-, or an aryloxy or heteroaryloxy group, each having 1 to 40 aromatic C atoms, in which one or more H atoms may be replaced by F, Cl, Br or I or which may be substituted by one or more non-aromatic radicals R^4, where a plurality of substituents R^4 may define a further mono- or polycyclic, aliphatic or aromatic ring system;

R^4 is on each occurrence, identically or differently, a straight-chain, branched or cyclic alkyl or alkoxy chain having 1 to 22 C atoms, in which, in addition, one or more non-adjacent C atoms may be replaced by $-R^6C=CR^6-$, $-C\equiv C-$, $Si(R^6)_2$, $Ge(R^6)_2$, $Sn(R^6)_2$, $-NR^6-$, -O-, -S-, -CO-O- or -O-CO-O- and in which one or more H atoms may be replaced by fluorine, an aryl, heteroaryl or aryloxy group having 1 to 40 C atoms, which may also be substituted by one or more radicals R^6, or OH or $N(R^5)_2$;

R^5 is on each occurrence, identically or differently, R^4 or CN, $B(R^6)_2$ or $Si(R^6)_3$;

R^6 is on each occurrence, identically or differently, H or an aliphatic or aromatic hydrocarbon radical having 1 to 20 C atoms;

Z is a straight-chain, branched or cyclic, preferably conjugated radical having 1 to 40 C atoms, which is preferably conjugated with the two other substituents, where the number of atoms of Z which link the group of the formula (1) and the aromatic radical is preferably an even number, where one or more non-adjacent C atoms may be replaced by -O-, -S- or $-NR^1-$ and one or more C atoms may be substituted by a radical R^1 or halogen;

and with the proviso that the molecular weight of the hole-blocking material B is greater than 150 g/mol.

3. Organic electroluminescent device according to Claim 1 and/or 2, characterised in that Y = C, P or S, and X = O.

4. Organic electroluminescent device according to one or more of Claims 1 to 3, characterised in that the hole-blocking layer comprises at least 50% of the hole-blocking material B.

5. Organic electroluminescent device according to Claim 4, characterised in that the hole-blocking layer consists only of the hole-blocking material B.

6. Organic electroluminescent device according to one or more of Claims 1 to 5, characterised in that the compounds of the hole-blocking material B do not have a planar structure.

7. Organic electroluminescent device according to one or more of Claims 1 to 6, characterised in that at least one of the substituents R^1 to R^4 in the hole-blocking material B contains at least one sp^3-hybridised carbon atom.

8. Organic electroluminescent device according to Claim 7, characterised in that the sp^3-hybridised carbon atom is a secondary, tertiary or quaternary carbon atom.

9. Organic electroluminescent device according to Claim 8, characterised in that the sp^3-hybridised carbon atom is a quaternary carbon atom.

10. Organic electroluminescent device according to one or more of Claims 1 to 9, characterised in that a 9,9'-spirobifluorene derivative, a 9,9-disubstituted fluorene derivative, an indenofluorene derivative, a triptycene derivative, 9,10-dihydrophenanthrene derivative, a hexaarylbenzene derivative or a tetraarylmethane derivative is present in at least one of the radicals R^1 to R^4.

11. Organic electroluminescent device according to one or more of Claims 1 to 10, characterised in that a 9,9'-spirobifluorene derivative or a 9,9-disubstituted fluorene is present in at least one of the radicals R^1 to R^4.

12. Organic electroluminescent device according to one or more of Claims 1 to 11, characterised in that the matrix materials A are selected from the group of carbazoles, silanes, polypodal metal complexes, oligophenylenes based on spirobifluorenes, ketones, imines, phosphine oxides, phosphine sulfides, phosphine selenides, phosphazenes, sulfones and sulfoxides.

13. Organic electroluminescent device according to one or more of Claims 1 to 12, characterised in that the hole-blocking layer is directly adjacent to the electron-injection layer or cathode.

14. Organic electroluminescent device according to one or more of Claims 1 to 13, characterised in that the phosphorescent emitter present is a compound which contains at least one atom having an atomic number of greater than 36 and less than 84.

15. Organic electroluminescent device according to Claim 14, characterised in that the phosphorescent emitter contains at least one atom having an atomic number of greater than 56 and less than 80.

16. Organic electroluminescent device according to Claim 14 and/or 15, characterised in that the phosphorescent emitter contains molybdenum, tungsten, rhenium, ruthenium, osmium, rhodium, iridium, palladium, platinum, silver, gold and/or europium.

17. Organic electroluminescent device according to one or more of Claims 1 to 16, characterised in that the glass transition temperature T_g of the hole-blocking material B is greater than 100°C.

18. Organic electroluminescent device according to one or more of Claims 1 to 17, characterised in that one or more layers are produced by a sublimation process.

19. Organic electroluminescent device according to one or more of Claims 1 to 17, characterised in that one or more layers are applied by the OVPD (organic vapour phase deposition) process.

20. Organic electroluminescent device according to one or more of Claims 1 to 17, characterised in that one or more layers are coated by a printing process.

21. Organic electroluminescent device according to Claim 20, characterised in that one or more layers are coated by the ink-jet printing process.

22. Organic electroluminescent device according to Claim 20, characterised in that one or more layers are coated by the LITI (light induced thermal imaging) process.

23. Use of compounds of the chemical structural unit of the formula Y=X, where X has at least one non-bonding electron pair and where the radical X stands for NR, O, S, Se or Te and R stands for an organic radical having 1 to 22 carbon atoms or for OH, OR, NH_2, NHR^6

or $N(R^6)_2$, where R^6 = H or an organic radical having 1 to 20 C atoms, and where the radical Y stands for C, P, As, Sb, Bi, S, Se or Te, as hole-blocking material in an electronic component, in particular in an organic light-emitting diode, organic solar cell, organic field-effect transistor, organic thin-film transistor, organic integrated circuit or organic laser diode.

24. Organic solar cell, organic field-effect transistor, organic thin-film transistor, organic integrated circuit or organic laser diode, characterised in that the structure complies with one or more of Claims 1 to 22.